



## Effect of Charge on Membrane Rejection During Ultrafiltration: Comparison of Dextran and Carboxymethylcellulose (CMC) Solutions

**Pinelo, M.; Prado, O.A.; Møller, V.; Meyer, A.; Jonsson, G.; Nicola Marsh**

*Published in:*  
Procedia Engineering

*Link to article, DOI:*  
[10.1016/j.proeng.2012.08.988](https://doi.org/10.1016/j.proeng.2012.08.988)

*Publication date:*  
2012

*Document Version*  
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

*Citation (APA):*  
Pinelo, M., Prado, O. A., Møller, V., Meyer, A., Jonsson, G., & Nicola Marsh (2012). Effect of Charge on Membrane Rejection During Ultrafiltration: Comparison of Dextran and Carboxymethylcellulose (CMC) Solutions. *Procedia Engineering*, 44, 1882. <https://doi.org/10.1016/j.proeng.2012.08.988>

---

### General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

**Euromembrane Conference 2012****[P3.092]****Effect of charge on membrane rejection during ultrafiltration: Comparison of dextran and carboxymethylcellulose (CMC) solutions**

M. Pinelo, O.A. Prado, V. Møller, A. Meyer, G. Jonsson\*

*Technical University of Denmark, Denmark*

Both dextran and CMC are linear polymers composed of glucose units. However, the presence of carboxyl groups in CMC confers a certain charge density on the molecule, which can be controlled via pH. During dead-end concentration of 40 g/L solutions of CMC and dextran, a rejection of  $\sim 0.9$  was observed for CMC, whilst a rejection of  $\sim 0.1$  was found during dextran concentration at the same operational conditions i.e. pressure, pH, temperature and MWCO. Results suggested that dextran filtration followed the osmotic pressure model, whereas the cake filtration model explained CMC concentration. Such different behavior was ascribed to the diverse capacity of aggregation of solute particles, which resulted in a different concentration polarization pattern and in turn, in a different fouling mechanism. Fouling patterns for both oligosaccharides were compared to the one followed during concentration of bovin serum albumin (BSA), whose charge density resulted in high protein aggregation and immediate external fouling. The results showed in this study help to better understand the influence of charge in the mechanisms behind concentration polarization and fouling, which strongly influence flux and rejection during concentration of oligosaccharides.

**Keywords:** Ultrafiltration, Carboxymethylcellulose (CMC), Dextran, Charge